SHADOW SHOWS AND PUPPET PLAYS

by

ELIZABETH MCM. HAMBLETON
Raymond Foundation

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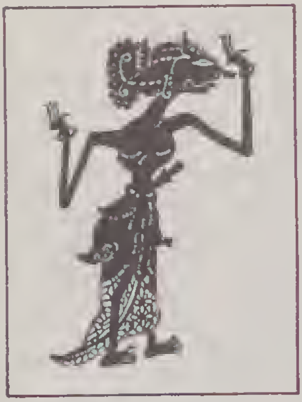

SHADOW FIGURE

The orchestra is tuning up. Come on; we must hurry. The play is about to begin. Here on the island of Java, in the East Indies, everybody will be at the shadow play, from grandfather to the baby, although baby will sleep through a good deal of it. Everyone laughs and talks and eats, even while the performance is going on. But that does not bother the *dalang*, the man who works the shadow figures. He knows that the people are watching, ready to catch him up if he should make the slightest mistake, for they too know the plays by heart. He sits behind a white sheet and holds up the actors, reciting the lines of each one. A lamp over his head casts the shadow of the figure on the screen, and as each character appears the people hiss the villain or cheer the hero just as we do in the movies.

These shadow figures are cut out of flat pieces of water-buffalo hide that has been dried and stretched and softened. Thin bamboo sticks are attached to the hands to make the arms work, and a pointed stake, by which the *dalang* holds the figure, is fastened to the body. He can handle only one or two figures at a time, and as there are often more than a hundred in the play, he sticks the extra ones, which he is not using at the moment, into a piece of the stem of a banana plant. These Javanese figures are brightly painted and wear gay clothes and headdresses. They have very thin waists and angular arms, and some of them have the longest noses you ever saw.

The people of Java would much rather watch a shadow play than see real people acting out the very same stories. They love the fat lumpy clowns and the jokes that the *dalang* makes them say. He must know the long stories by heart, work the figures, recite their lines, and lead the orchestra at the same time. That is quite a job for one man, isn't it?

It was long, long ago in China that shadow figures were invented. Nowadays, in the big cities of China, everybody goes to the movies, but in the country towns the shadow plays are still given. The actors are cut out of dried donkey-skins and are gaily painted. They are so transparent that the shadows they cast on the screen are softly colored. In the cities only a few very old men still know how to handle the little figures, and soon there will be no one left to present the shadow plays.

Shadow figures are such fun to make. Try it some time. You cut the actors in profile out of cardboard. Then you join the arms to the body with bent pins. You will have to fasten a stick to the body so that you can have something to hold it with. All you need is an electric light and a sheet and you can give a grand entertainment for your family and friends.

In America we are more familiar with puppets, or marionettes, as they are sometimes called. The best-known kind hangs from strings fastened to a wooden crossbar. Separate strings are attached to the hands and feet and head, and you have to be very careful that you do not mix up your strings and make your actor do a high kick when he is supposed to be bowing low to his lady. There is another kind, used in Java and China, which, like the shadow figures, is attached to a stick. Also there is the type which fits on your hand so that your middle finger moves the head, and two other fingers act as arms.

If you were living in France, you could wander in the park any day and see a man with puppets acting out the story of "Polichinelle." Around him there are always crowds of children who never get tired of seeing the same story over and over again. The Italians call this well-known puppet "Puncinello" or "Pulcinello," and the English call him "Punch." Punch, with his beak of a nose and hunch back and high squeaky voice, throws the baby out of the window, quarrels with his wife, Judy, and boasts about how wonderful he is. Toby, the dog, with a frilly ruff around his neck, adds his barking to the general commotion, much to the delight of the English children. And so, you see, all over the world, children and grown-ups, too, love make-believe actors.

ELIZABETH McM. HAMBLETON
Raymond Foundation

NOTE: There are Javanese puppets in Hall 6, as well as Javanese shadow figures. The Chinese shadow figures are in Hall 32.

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NATURE'S BRIDGES

by

MARIE B. PABST
Raymond Foundation

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RAINBOW BRIDGE

Rainbow Natural Bridge, one of the scenic wonders of our country, is the largest formation of its kind known in the world. It arches over a canyon that was cut years ago in the sandstone of southern Utah by Bridge Creek, a tributary of the Colorado River.

Many years ago the stream curved in great loops through the sandstone. Its channel followed the easiest course, where the rock was softest and therefore most easily crumbled. Where the bridge now stands there was a horseshoe curve and during high water, when the current was strong, the river dashed against the wall of the horseshoe on one side, rounded the end of the curve and hurled itself against the high wall of the horseshoe on the other side. The partition separating the two curves of the river was worn thinner until a crack was made and the water began to trickle through. The gap was cut larger and larger until finally the stream no longer flowed around the wide curve but rushed through the new short cut it had worn in the canyon wall. Today the volume of water carried by the river has diminished and only a small rivulet remains to flow through the huge gap cut years ago. One side of the bridge remains attached as part of the rock wall while the other side reaches down to the canyon floor. Between them is the gap cut by the ancient river.

The vault of the bridge is so tall that if the United States capitol building were placed inside, the arch would tower above the dome of the building. From one pier to the other the bridge stretches 274 feet and its arch towers 309 feet above the foot of the gorge.

Indians who were hunting in this region discovered the bridge. The pink arch was so beautifully colored that they called it the "Rainbow Arch." The streams of this high arid country have furrowed so many deep, straight-sided gorges in the bed rock of the plateau that it is difficult to traverse the land. So dangerous is the journey that few Indians ever came to Rainbow Bridge, and it is not surprising to learn that no white man had seen the bridge in its lonely canyon until in 1909 a touring party visited the beautiful arch, having been told of its existence by the Piute Indians. A member of this party recommended that the bridge be made a national monument and this was done in 1910. Today increasing numbers of tourists are viewing the mighty rock formations now accessible by means of bus trips.

There are many other natural bridges in southeastern Utah but none of them is so large or so lovely as the Rainbow Arch. Some of the bridges bear the names of the Mormons who were the first white settlers in this section of Utah.

Natural bridges are not rare elsewhere but sometimes they are formed in other ways. Along the coasts of Norway, Sweden, and Scotland the ocean waves have carved out many coves. The action of the waves beating on the rock cliffs wears out the softer material and caverns are formed. Sometimes portions of the roof collapse and the part left standing forms a natural bridge. The remains of the cliff forming the bridge are still attacked by the waves and eventually the bridge also crumbles away.

Bridges are often formed by underground water that seeps through soluble rock, usually limestone, and dissolves the rock along weakened joints and cracks. Long underground caverns or channels are formed. Occasionally some of the rock forming the roof sinks in, leaving a bridge in the spot where a portion of the roof remains. A notable example is the Natural Bridge in Wolfe County, Kentucky.

The famous Natural Bridge of Virginia was also formed by the action of water, which cut through the weaker under-rock, leaving the stronger layers to form the bridge. The property on which this bridge is located was purchased by Thomas Jefferson and he so admired the wonder that he had a summer home built nearby so that he could bring visitors from this continent and Europe down to see the towering stone arch. There is a tradition that George Washington carved his initials in the rock of this bridge and guides still point them out to visiting tourists. Today a modern concrete highway crosses the Virginia Bridge.

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ANIMALS OF THE SURF

by

LEOTA G. THOMAS
Raymond Foundation

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ANIMALS OF THE SURF

SURF ANIMALS

Millions of tiny plants and animals that live in the sea are brought to shore by the tide. They make up the food supply of the animals that live near the beach. Shore-dwelling animals must be prepared to grasp this food and must also be able to live through the time when the tide is out. Consequently, the animals of the surf have developed very interesting forms and habits to meet these conditions. Some float in the water and are washed about by the waves; others cling to the rocks; some have hard coverings that prevent evaporation and give protection, while others have no coverings and therefore burrow down into the sand or mud along the beach.

The Sea Anemone has a soft body and can slide along the rocks, but usually it holds fast to the rocky ledge and looks more like a flower than an animal. Its long tentacles may be white or blue or red and look like flower petals as they wave about. They sting and grasp tiny animals for food.

Jellyfish, that float in the sea, may be as much as two feet in width. From the opened, umbrella-like top hang numerous tentacles with cells that sting their prey until it is numb. The Portuguese Man-of-War is one of the most beautiful of the larger jellyfish. His bright red top is very noticeable.

Barnacles, protected by conical shells, cling to rocks or any hard object partially covered by the sea. Through a hole in the top of the shell, the barnacle gets its food as the water washes over it. The hole can be closed during the time when the barnacle is exposed to the air. Among the barnacles, as well as on the sandy beach, are thousands of pointed periwinkles. Like the true snail, the periwinkle carries its house on its back and moves very slowly by putting its one foot forward and drawing its body up to the foot.

The shore snail has eyes and it can look out and up to see what is going on as it slowly "one-foots" along over the sand. The traveler keeps an eye out for danger, for at any moment a crab may come along, and then—woe unto the snail.

The Hermit Crab has no shell over the soft, hind part of its body, and if it does not provide protection, it may be eaten by some hungry creature. Therefore it fits itself into a snail shell.

The Fiddler Crab has an oversized claw on one of its front feet. This is its weapon of defense and with this claw it also protects the female. A large company of Fiddler Crabs is a funny sight. They walk along together until something frightens them, and then, as one body, they move from one side of the road to the other until they get close to their homes. Then they suddenly break rank and scoot for cover into their burrows.

Some bits of broken shell, sand and seaweed cemented together may be a chimney that leads to the underground home of a sand-burrowing worm. One of these worms is a beautiful creature clad in steel-blue armor with red plumes on the upper part of its body. With long, tapering tentacles it reaches out for the tiny creatures in the sand that make up its food supply.

The five-rayed starfish is common along the shore. There are starfish with as many as forty rays but such starfish are rare on the beach. When a starfish comes into a neighborhood, all the clams close their shells or hurriedly dig into the sand, for they are well aware that they may become its victims if it is hungry. With its long rays it can pull their shells open, and with its mouthlike stomach it can draw the soft bodies of its victims from their coverings.

Sea Urchins, of which Sand Dollars are a flat form, are cousins of the starfish, but they eat plants instead of animals. They draw in mud from the floor of the shallow water where they stay, and from the mud they get the plants. The Sea Urchin is globe-shaped with long, stiff spines, and the Sand Dollar is a flattened disk with short, soft spines. Both walk more by means of their spines than by their tube feet. Another cousin of the starfish is the Sea Cucumber, a long, cylinder-like creature with a fringe of tentacles around its head. When it moves it stretches forward, then pulls its body up to its head, much as a worm crawls. If an enemy approaches, the Sea Cucumber throws away some of its body parts to scare off the intruder—a very effective defense. Later it can grow new parts to take the place of those thrown out.

LEOTA GREGORY THOMAS
Raymond Foundation

NOTE: Some animals of surf and shore are on exhibition in the Main Hall of the Museum.

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A BIRCH BARK CANOE

by

MIRIAM WOOD
Raymond Foundation

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A BIRCH BARK CANOE

INDIAN CANOE

When you paddle your canoe down the river or along the lake shore, you probably are not hunting for animals; you are not moving from one home to another; you are not even going on an errand for your mother—you are paddling your canoe just for fun.

Many years ago the Indians who lived along the shores of Lake Michigan paddled their canoes in the lake, too, but not for fun. The canoe was one of their means of transportation. They had no street cars, buses, trains, or cars to ride in; they followed trails through the woods or rode in canoes on the waters. When all the food in one part of the woods had been used, the Indians had to move on to another place and they often traveled in their canoes across rivers and lakes. As they traveled, they hunted for animals from which to obtain food and clothing. These Indians really needed and used their canoes.

The Indian hunter quietly dipped his paddle into the water and the canoe slipped along so noiselessly that the beavers were surprised at their work and slapped their tails on the water as danger signals to warn all the other animals. The startled deer raised her head from the water and was still for an instant; then she too was gone into the protecting woods.

How could the Indians paddle their canoes so noiselessly? When many of us try to paddle a canoe we splash the water and make a terrible noise—the animals would hear us coming and would surely be safely hidden by the time we arrived. But we don't have to sneak up on the animals to get food to eat or clothes to wear and so it is not necessary that we paddle our canoes so quietly.

Perhaps the little Indian boys and girls slapped the water with their paddles when they first began to go canoeing. Can you not imagine how an Indian father and mother, and maybe the older brothers and sisters, smiled when the small beginner gave himself a shower bath of water as he first tried to use his paddle? But he tried again and again because he knew that he had to learn how to dip the paddle in the water without a sound; he knew that he had to learn to make the canoe go silently;

otherwise how could he be an Indian hunter and help provide food and animal skins for his family? So he practiced until he could make the little boat go so smoothly that even the curious red squirrel, who always knows everyone's business, was surprised and scolded saucily from a safe distance as the boy went gliding past and on around a curve of the lake.

The canoes were made of whatever materials the Indians could find. In the forests where the birch trees grew, the Indians used birch bark. This was what an Ojibway Indian boy used when he helped his father build a canoe. They started work in the spring of the year when the birch bark was moist; they collected spruce or ash wood, large strips of birch bark, and sticky gum or pitch from the fir trees. The boy put the gum in a bark bucket and melted it over a fire. While he was doing this his father was making a long slender canoe framework from the spruce or ash wood. Together they laced or sewed the strips of glistening birch bark onto the frame. They carefully filled the sewed seams with melted pitch or gum to make them waterproof. Then the whole canoe was rubbed with deer fat. Finally all was ready, and the Indian boy proudly watched as his father balanced the canoe lightly on his shoulder and carried it down to the lake.

There he carefully placed it in the water and the boy waited eagerly to see if it balanced, if it was water-tight, and if it rode the waves well. Soon it rocked gently back and forth as the waves lapped at its lovely brown sides. The water did not seep through the seams. Then the happy Indian boy stepped into the canoe, lifted his paddle, and sent the shining little craft out into the lake where it cut the water perfectly and noiselessly on its first voyage.

The Indian boy's canoe carried him among trailing branches along the shores, and through the wild rice swamps. There he pulled the heavy, ripe heads over the side and shook the grains into the boat—food for his family. As time passed, the bow became scratched and green grass stains spotted its once clean sides. Still it was his birch canoe, a friend in time of need.

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THE STRANGE PLATYPUS

by

LOREN P. WOODS
Raymond Foundation

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Museum Stories, Number 5

THE STRANGE PLATYPUS

THE DUCKBILL PLATYPUS

The platypus or duckbill is the queerest of all mammals. It has a beak like a duck, a flat tail like a beaver, four legs, and webbed feet. It can live either on land or in the water.

Although the platypus is a mammal it lays eggs. These are usually two in number, white in color and one-third the size of a hen's egg. They are complete with yolk, white and shell. After the eggs have been laid, the mother curls her body around them to keep them warm until the young are hatched.

The newly hatched babies are about the size of a lima bean and have the appearance of a grub worm—smooth, white, and shiny. The mother's milk flows out on her skin and they suck it from her hair. At first the babies have teeth, but these soon fall out to make way for the tough, horny plates with which the adults grind their food. In very young animals the beak is soft, resembling a pair of thick lips. The young grow very fast and after two or three months are able to take care of themselves.

The duckbill is found only along the banks of streams in eastern Australia and on the island of Tasmania. Its webbed feet, broad tail, and the flattened shape of its body make it a strong swimmer. Its food consists of snails, worms, and water insects which it collects in its cheek pouches by straining mud from the bottom of the stream through notches in the edges of its horny bill. The platypus may stay under the water for as long as ten minutes if it has been frightened, but the usual length of time is about one minute. Duckbills enjoy playing in the water and may sometimes be seen floating downstream on their backs. When floating, the body is held in a U-shaped position with the head and tail raised out of the water, while the furry little animals slowly munch the food which they have gathered on the bottom of the stream.

Even though the platypus is very fond of the water, it cannot be wet for too long a time. There must be a warm, dry place where it can comb its fur and can sleep and rest. So the mother builds an elaborate burrow in the river bank. This usually has two entrances. One opening is under water, and the other is often hidden in a mass of weeds in a dry place above the surface of the stream. This second entrance is used when the platypus comes out in the late afternoon to sun itself and get thoroughly warm and dry. The two entrances connect by means of tunnels with a room where the platypus builds its warm nest of rushes and grasses. In this nest the eggs are laid and brooded. When the platypus goes into its den, it usually plugs up the tunnel in several places with earth. This protects it from the animals which might wander in and disturb its slumber.

The father platypus is the only poisonous mammal in the world. On the inner side of the hind leg he carries a horny spur which is hollow and is connected by a long tube with a poison gland. The venom from this gland resembles that of a snake but is not so deadly.

The voice of these curious animals is like a tremulous snore. The mother platypus often uses her voice to call her babies, especially while she is teaching them to swim. They answer with a lower, softer growl.

The duckbill is looked upon by scientists as a modern illustration of an ancient transitional form of life, produced while nature was developing reptiles, birds, and mammals from the primitive types of animals which existed several million years ago. The body structure of the duckbill shows close resemblances to some ancient fossils. Some of the bones are shaped like those of reptiles, but most of them are like the bones of mammals.

This peculiar and interesting animal does not live long if taken away from its natural home. This makes the study of its habits difficult because it is shy and timid and generally comes out of its burrow only at night. Once captured, however, it is gentle and easily tamed, recognizes its friends, and answers to its name.

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ELEPHANTS OF TODAY

by

MIRIAM WOOD
Raymond Foundation

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Museum Stories, Number 6

ELEPHANTS OF TODAY

MODERN ELEPHANT

Most of us have seen circus elephants plodding along in the parade or performing at the commands of their trainer. We are familiar with the elephants in the zoo. It is fascinating to watch them lazily and rhythmically swinging their huge trunks to and fro, first to one side, then to the other. One elephant may gather up a wisp of hay, roll it into a ball with his trunk, and then swing it up into his mouth; or he may flap his ears at us and wiggle his tail. Sometimes his tiny eyes seem to look directly at us, but probably he doesn't see us at all because he has very poor eyesight. He has to depend upon his sniffing nose to tell him what is going on about him.

The nose, or trunk, of the elephant is his most priceless possession. Can you imagine an animal who smells and sniffs with his nose and also uses it as a finger to lift objects ranging in size from a blade of grass to a tree trunk? The elephant may use his trunk as a weapon to "whack" things; as a bugle, which makes the plains and jungles quiver with its loud trumpeting; or as a shower spray with which he washes and cools his inch-thick hide.

Now let's shift scenes to Africa where there are no trainers or keepers to care for the elephants. There they wander through the forests, the grassy plains, and the low, hot lands. Occasionally the herd stops to feed. One elephant may pull the leaves off the branch of a tree; if another prefers the roots, he simply and easily butts his head against the tree and shoves it over. Possibly he places one foot on the trunk of the tree to help push it to the ground; then, by using his ivory tusks, he pries up the roots.

Elephants often travel fifty or sixty miles in a day, especially if they are searching for clear drinking water. When they find the water, each elephant drinks, and then takes a shower bath. If the elephants are not in a hurry, they may stop and wallow in the oozy mud.

Even an elephant needs sleep and rest. He usually sleeps standing, with his tiny eyes closed and his huge trunk hanging limply to the ground. An elephant with heavy tusks often places his head in the fork of a tree and then goes to sleep. He even snores, so some people say.

After resting through the night, the elephants wander on. Sometimes they seem to enjoy climbing hills. Can you imagine one of these huge animals (the largest land animals in the world) climbing a steep hill? He goes up very slowly, but the fun begins when he reaches the top and starts sliding down the other side of the hill. He makes a terrifying noise, like a landslide.

In a herd of wild elephants, there are usually several young ones. Each mother elephant pushes her baby along beside or in front of her, guiding him with her trunk. Should he get mischievous, she spanks him with her trunk, but she always watches to see that no real harm comes to him. He swims beside his mother when the herd is crossing a river and if he gets tired, he hangs onto her ear while she pulls him across the stream. The baby elephant does not know how to use his trunk or what to do with it; it hangs as limp as a rope. As he grows older, he begins to swing it around; then his mother teaches him how to use it. The first few times the baby tries to drink water with his trunk, as his mother does, he only manages to blow bubbles, or he shoots the water off in the wrong direction, missing his mouth.

Africa is not the only native home of elephants; some live in India. The Indian elephants are not quite so large as the African ones. Their ears, especially, are much smaller. On the middle of his forehead each Indian elephant has a bump which is often called his "bump of wisdom," and he has five nails on his forefeet and four on his hind feet; the African elephant has four nails on his forefeet and three on his hind feet.

Indian elephants have been tamed and are trained to carry or pull heavy loads. Each elephant has a "mahout," a man who takes care of him. After a long day of hard work the kindest thing a mahout can do for his elephant is to, take him down to the river, where the elephant lies down in the shallow water and the mahout crawls over him and rubs his tough hide with a stiff brush. The elephant loves this brushing and he closes his tiny eyes and twitches his long nose in complete happiness while his back is being scratched.

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FIELD MUSEUM STORIES

In Faraway Manchukuo

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CAMEL AND MANCHOUKUO BOY

A map of Asia in any geography textbook published before 1931 will show to the northeast of China a region labeled "Manchuria." A map of today shows the same area, but the name will be "Manchoukuo." The change came when the Japanese seized the land in 1931.

This part of Asia was once a favorite feeding ground of the mammoths and the woolly rhinoceros. Later, man settled here. Long before the Christian era, the Tungus occupied much of the region. They were fierce, warlike men and believed in the power of mighty giants. Today, some of the Tungus, known as the Goldi, still live in the Amur Valley. They are very primitive, living by hunting and fishing.

This "Great Land Outside the Great Wall," as the Chinese call it, is about six times as large as our own state. It has always been a desired area. The northern Chinese, when driven from their homes by famines and floods have found new homes in this land of the Manchus until today about 90 per cent of the people are Chinese; the Koreans have entered from the east and cultivated its rich farming lands; the Russians have longed for it as a short cut to their eastern Siberian ports, and the Japanese have coveted its wool, hides, food products, timber, and minerals.

While many parts of Manchoukuo are dry and desert-like, there are many fine rivers in the north and the Yellow Sea touches it on the east. The summers are hot, with long hours of sunshine, and the winters are very cold. The chief port, Dairen, lies directly across from the city of San Francisco in California, yet the temperature often goes to forty below zero in the winter. In spite of this intense cold, the port of Dairen is always open for shipping.

Due to heavy floods in July and August, much of the land is excellent for the raising of rice. The Koreans, while they buy millet for themselves, are especially interested in growing rice and raise great quantities which are shipped to Japan. Other important food crops are wheat, kaoliang or sorghum, and soy beans.

Soy beans are native to Manchoukuo. To the Chinese and Japanese the soy bean is next to rice as a food. "Tofu," a bean curd, is eaten in some form at nearly every meal. It is cooked with vegetables, meat, or fish, and is to the people what salad oil, lard, and butter are to us. Of recent years soy beans have become of importance in our own country. In many parts of Europe soy beans are used in place of coffee, and sauces made from soy oil are now known in all countries. There are great mills in Manchoukuo where the oil is pressed from the beans and the remainder made up into cartwheel-shaped cakes weighing 64 pounds each. This soy meal, as it is called, is fine food for the great numbers of cattle, horses, donkeys, pigs, sheep, and goats raised on the stock farms of northern Manchoukuo.

The Chinese inhabitants of Manchoukuo have always known how to farm. Since the Japanese took over the land, experiment stations have been established in an effort to do the farming more as it is done in western countries and thus secure more for the Japanese nation. The raising of wheat is becoming important in the north, while the people who live in the forest regions are producing an excellent silk from the cocoon fibers of the tussah-silk caterpillar which they raise on the leaves of oak trees.

The gold mines of Manchoukuo are extremely valuable. Some of them have been known since ancient times and many strange legends have sprung up regarding some of them. At Fushun, near Mukden, is one of the largest and richest open cut, soft-coal mines in the world. There are also iron deposits of value.

In recent years, railroads have been built connecting the most important parts of Manchoukuo. Some of the centuries-old cities now have paved streets, radios, automobiles and airplanes. The ruler, Henry Pu-yi, the former "Boy Emperor of China," and his wife, Elizabeth, live in a modern type of house, enjoy all kinds of sports, and speak beautiful English.

But life away from such cities is much as it has always been. The peasants still live in their "paos" or dome-shaped tents with walls of mud. The little girls still carry their baby brothers on their backs at work or play, and the two-humped camels still groan about nothing as they wait outside the village walls formerly built to keep bandits away.

MARGARET M. CORNELL
Raymond Foundation

NOTE: In Hall 3 may be seen bronze, life-size figures of a Manchu and a Korean, and several of Chinese and Japanese. In Hall 25 are soy beans from Manchuria and soy oil, and among the Chinese exhibits are many objects which belonged to the Manchus.

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HORNS AND ANTLERS

by

LOREN P. WOODS
Raymond Foundation

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NATURAL HISTORY
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Museum Stories, Number 8

HORNS AND ANTLERS

HORNS AND ANTLERS

Horns and antlers are similar in appearance, but they differ in structure. A horn is a hollow outgrowth of the skin and is partially filled by a bony core. Antlers are solid, bone-like growths attached to the skull. They are found only on members of the deer family.

Horns, which are a characteristic of sheep, cattle, and antelopes, vary widely in shape and size. Unlike antlers, they are not shed every year but are permanent. Usually they are two in number, although there may be only a single one. They may be straight or curved, and the surface may be ringed or smooth or ridged. Generally they are not branched, although the American prongbuck possesses branched horns. The horns of the prongbuck, unlike those of sheep and cattle, are shed annually. The horny sheath gradually loosens and becomes freed from the skin around the base. When the horn falls off it leaves the bony core covered with blackish skin. A new sheath begins to develop on the tip of the core and grows toward the base and at the tip until a new horn is fully developed.

A still different kind of horn-like structure is that on the snout of the rhinoceros, whose horn is made of densely matted hairs.

Antlers are different from horns in that they are solid and deciduous; that is, they are shed every year, usually late in the winter. New ones begin growing a month or two later. When new antlers are to be formed, the bumps where the old antlers grew receive an increased supply of blood and this blood deposits the bony material which gradually builds up into a new set of antlers. During their growth the antlers are covered with soft, hairy skin which is called the velvet. When the growth of the antlers has been completed the velvet dries and is rubbed off against trees and bushes.

Antlers are of various shapes and sizes. In some deer they are merely short, simple spikes, but the antlers of the wapiti or moose may be enormous and either branched or hand-shaped. A new branch is usually added each year, until the animal is mature, but when a buck has passed his prime the antlers gradually become smaller.

Primitive men found a great many uses for horns and antlers taken from dead animals. Neanderthal men flaked flint with antlers and used the prong-points as daggers. Later Stone-Age men used antlers to make picks for mining flint. Here in North America antlers were used for flaking flint by pressure, to make smooth and delicately worked arrowheads.

From very early times, horns have been used for signaling and as musical instruments. Some primitive people believed that there was magical power in the sounds of certain horns.

For many years the Chinese have used the ground-up horn of the rhinoceros and the velvet from antlers as medicine. A rhinoceros horn was believed to make poison harmless. The Chinese also carved rhinoceros horn into beautiful cups.

All sorts of horns were cleaned and polished and used by peoples other than the Chinese for drinking-cups and containers. Horns were often carved into ladles and spoons. The Haida Indians on the northwest coast of North America used the horns of mountain sheep and goats for such purposes. Certain African tribes used the long, straight horns of the beisa antelope as spear points. Such horns were also carved as handles and fitted onto swords.

Before men had discovered the process of making glass, thin slabs of horn were sometimes used in windows. Horn instead of glass is still used in parts of Asia where people fit thin sheets of it into lanterns. Horns were symbols of strength and power to the early Germans and Norsemen, who fashioned their helmets with horns on either side. Furniture and houses, too, were decorated with horns and antlers.

Today, horn is used throughout the world in the manufacture of many useful and ornamental articles, such as handles of walking sticks, umbrellas, and carving knives. Horn is easily carved; yet it is tough and durable and will bend easily. When it is heated in water it becomes soft. Then it can be molded and pressed into desired shapes. It may be split into thin sheets, or pieces may be welded together if both heat and pressure are applied. The horn article may then be polished or dyed.

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PUEBLO POTTERY

by

ELIZABETH McM. HAMBLETON
Raymond Foundation

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PUEBLO POTTERY

INDIAN JAR

"Our ancestors made pottery in the same way that we do," say the Pueblo Indian women. They sit in a sunny corner outside the house, fashioning bowls and water-jars and pots from smooth, soft clay. The art of pottery-making among these Indians who live in northern Arizona and New Mexico, has been handed down from mother to daughter for hundreds of years.

When the Spanish explorers came into this region about 400 years ago, they found the ancestors of these modern Indians living in villages which resembled long two- or three-story apartment houses. The early Spaniards called this unusual type of building a "pueblo," which was their word for "town" or "village," and it is from this word that the Pueblo Indians got their name.

They built their pueblos of stone, since in the dry desert land where they lived there were few trees from which they could secure wood. They had very little furniture but they did need something to hold food and water. So they made baskets from grasses and roots, and pottery from clay. Nowadays the Pueblo Indians use tin pots and pans, but they still make pottery to sell to the tourists who pass through their villages.

In the old days, when an Indian died his belongings were usually buried with him for his use in the next world. The contents of these old graves—the weapons and tools and dishes which have been dug up by scientists—tell the story of the daily life of these ancient people. Some of the beautiful pieces of pottery that you can see here in the Museum were found in graves, and others were found in the ruins of villages.

The Indians make their pottery by the "coil method," as their ancestors have done for a thousand years or more. The clay is dampened and kneaded like dough until it is smooth and pliable. The potter takes a lump of this soft clay and rolls it out into a long, thin rope. Then she winds the clay rope round and round, each layer resting on the one below, until the walls of the pot have been built up. She scrapes the pot with a piece of shell from a dried gourd and sets it out in the sun to dry for a few hours. Next she adds the slip, which is a thin layer of paint made by mixing some colored clay with water. The potter then takes a smooth pebble and rubs the pot until it is smooth and shiny all over. The next step, the design, is the most important of all.

The Pueblo Indian women say that they dream their designs. Most of the patterns look very much alike, but you will seldom find two which are exactly the same, no matter how many pieces of pottery you see. Certain elements of the patterns have a meaning to the artists. A triangle may represent a mountain, a row of dots raindrops, and a zigzag line a snake, or a river, or lightning.

For a brush the painter uses the leaf of the yucca, a prickly desert plant. She chews the leaf until it is soft and frayed out. For paint, she uses the juices of various plants or grinds up certain kinds of colored rocks to powder, which she mixes with water.

The final step in making a piece of pottery is the baking. The pottery is laid in a pit and covered with dry twigs and branches which are set on fire. When the fire has burned to ashes, the pots are taken out and are ready for use. The baking must be done very carefully, as a fire which is too hot will make the pots crack, and a smoky fire will smudge them.

On some of the big water-jars you can see a black band which runs around the middle. The Indians call this the "life line." "The ends of the line must never meet," says the Pueblo Indian artist, as she paints this part of the design, "for if it were completed, my life would be completed, too."

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FIELD MUSEUM STORIES

Nature's Crystals

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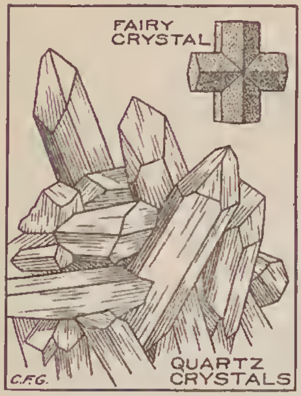

MINERAL CRYSTALS

Most boys and girls know the game called "kingdoms" in which one has to tell whether an object belongs in the mineral, animal, or plant kingdom. Included in the mineral kingdom are rocks like granite, metals such as copper, and beautiful gem stones such as rubies and emeralds. Many precious stones occur in crystals, which have been called the flowers of the mineral kingdom.

To most people a crystal is either a clear, transparent ball or a sparkling piece of bright stone. Practically every mineral, formed under favorable conditions, will be found as crystals, which are solid substances, regularly shaped, with angles and flat surfaces. The mineral particles making up the crystal are arranged in a definite order. Scientists have separated the varying types of crystals into six classes or groups. Regardless of size or shape the same mineral will always crystallize in the same class.

The mineral with which you are most familiar is water. Usually it is a liquid, although water is also found in a solid form. Ice, hail, and snow are solid forms of water. Snowflakes are nearly perfect water crystals and each one is built about a pattern of six equally spaced points. Ice crystals are crowded so closely together that they do not have a chance to grow into perfect shapes. If you use a magnifying glass to examine a number of snowflakes you will be amazed at the variety of designs, yet each snowflake will have the same fundamental six-pointed pattern.

Another common mineral whose crystals can be easily seen is salt. Under a magnifying glass it will be observed that each tiny crystal is shaped like a cube.

Crystals are formed in a number of ways. One of the most common is by "precipitation," or separation, particle by particle, from a liquid in which the mineral is dissolved. Water seeping through the ground dissolves the rocks and carries them away. As the water descends it picks up more and more mineral matter until it becomes so saturated that it can carry no more. A change in temperature or the amount of pressure on the mineralbearing water may cause it to deposit part of its load. In the rocks there are free spaces or cavities in which crystals may form if there is a sufficiently long time for them to grow undisturbed.

Some crystals are large and others are so small that you can not see them without a microscope. In mines in South Dakota, crystals have been found forty-seven feet long and weighing thirty-seven tons. Beryl crystals weighing several tons have been found in New Hampshire.

If you care to try an experiment, it is easy to watch the formation of crystals. In a small bottle dissolve two or three tablespoonfuls of sugar in warm water. Shake the bottle until the sugar is in solution. It has then entirely disappeared. Then hang a string in the water and put the bottle away. As the water cools and evaporates the sugar will crystallize out on the string and you will have the string coated with sugar crystals. Perhaps you have found sugar crystals in syrup or honey.

Crystals sometimes play tricks and appear in fancy costumes that might be confusing except for that unchanging rule that crystals must form in the class to which they belong. Twin crystals are fairly common. One type of twin has crystals that are just alike except that one is left-handed and the other is right-handed. Their inside hands are joined together and these twins are never found separate. Other crystals have "inclusions"; that is, one mineral has formed around another, and in the crystal thus formed the two minerals will be seen, one inside the other.

In the Blue Ridge Mountains of Virginia interesting twin crystals are formed by the mineral staurolite. These twins are called "fairy stones" and are in the shape of small crosses. Staurolite crystals are dark reddish-brown in color and are not transparent. People carry them for good luck charms and there is a fairy story telling how they were formed. According to the story, fairies were dancing in the forest when a messenger brought them the sad news of the death of Jesus. So unhappy were the fairies that they wept. The tears fell to the ground where they turned to stones in the shape of crosses. Long ago the fairies vanished from the beautiful Virginia forests but the crystal crosses are still found.

MARIE B. PABST
Raymond Foundation

NOTE: There are crystals in Hall 34 and the gem room. Notice also the large, beryl crystal near the two elephants in Stanley Field Hall.

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